



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,116	06/19/2007	Chu Yong Cheng	03164.0205USWO	3811
23552	7590	10/05/2009	EXAMINER	
MERCHANT & GOULD PC			STALDER, MELISSA A	
P.O. BOX 2903			ART UNIT	PAPER NUMBER
MINNEAPOLIS, MN 55402-0903			1793	
			MAIL DATE	DELIVERY MODE
			10/05/2009	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/588,116	<b>Applicant(s)</b> CHENG ET AL.	
	<b>Examiner</b> MELISSA STALDER	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-10, 18- 20, 23- 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Preston (GB 2,109,357) in view of Mihaylov (US 5,447,552).

Preston teaches a process for the extraction of nickel or cobalt from an aqueous solution. These metals are selectively removed from impurities such as magnesium (the metals can be separated from each other – pg. 1, lines 8-12). The process in Preston uses carboxylic acid extractants with non-chelating oximes, preferably of aldehydes wherein the alpha-carbon atom is primary or secondary (abstract), such as 2-ethylhexanal oxime. Preston also teaches the presence of additives which greatly enhance the utility of extractants (kinetic accelerator) (pg. 1, lines 5-8). Preston teaches that it is known in the art to use tri-n-butyl phosphate (TBP) as a kinetic accelerator (pg. 2, table). Mihaylov also teaches that it is known to use TBP when extracting Ni and Co in order to avoid oxidation of Co (col. 2, line 68-col. 3, line 12). It would have been obvious to one of ordinary skill in the art at the time of the invention to use TBP simultaneously in the extraction process with the oxime and carboxylic acid because Preston teaches that TBP is a kinetic accelerator and Mihaylov teaches that TBP is

Art Unit: 1793

beneficial in the metal extracting process to avoid oxidation. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Preston and Mihaylov because Mihaylov teaches that use of the oxime process and TBP prevents oxidation of cobalt and is useful for separating Mn and Mg and other impurities (col. 3, lines 13-31). The references teach the use of the acid, oxime, and accelerator in this process and so it would have been obvious to use them all at the same time during the leach process.

Regarding claim 2, Preston teaches a solvent extraction process with xylene (pg 2, initial test).

Regarding claim 3, Preston teaches the avoidance of the formation of cobalt (III) which is not amenable to conventional stripping techniques (pg. 1, lines 62-64). Cobalt (III) is formed from cobalt (II).

Regarding claim 4, Preston teaches a stripping step using a mineral acid solution (pg. 1, lines 64-65).

Regarding claim 6, Preston teaches steps for selective stripping of nickel or cobalt and nickel together (pg. 2, lines 1-4).

Regarding claims 7-10, Preston teaches that the extraction takes place extremely quickly - "of the order of a few minutes" (pg. 1, lines 58-62).

Regarding claim 18, Preston teaches that it is known in the prior art to use LIX63 which is a known chelating hydroxyoxime.

Regarding claim 19, Preston teaches that the extractant process is much faster making the stripping process also faster (pg. 1, lines 58-65).

Art Unit: 1793

Regarding claim 20, Preston teaches acid extraction in the pH range of 0 to 5.

Regarding claim 23, Preston teaches the extraction of Co and Ni and also teaches that a stripping step can be used (pg. 2, initial tests).

Regarding claims 24, 25, 26, and 28 Preston teaches acid extraction in the pH range of 0 to 5. Preston also teaches that it is known in the art to selectively extract nickel or cobalt (pg. 1, lines 50-57).

Claims 1, 2, 4-7, 14, 15, 16, 22, 23, 26, 27, 30, 31, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng (WO 02/22896) in view of Mihaylov (US 5,447,552). Cheng teaches a process for separating nickel and cobalt from other elements contained in an aqueous leach solution such as calcium, magnesium, and manganese which remain in the leach solution. Cheng teaches the use of a carboxylic acid, a synergist, and an oxime, particularly non-chelating oximes (pg. 7) with a hydroxy group attached. Mihaylov teaches that TBP is beneficial in the metal extracting process to avoid oxidation. Further, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Cheng and Mihaylov because Mihaylov teaches that use of the oxime process and TBP prevents oxidation of cobalt and is useful for separating Mn and Mg and other impurities (col. 3, lines 13-31).

Regarding claim 2, Cheng teaches the use of kerosene (pg. 8).

Regarding claims 4-6 and 22, Cheng teaches a scrubbing step and a selective stripping step (pg. 9).

Regarding claim 7, Cheng teaches the use of a synergist in the extraction process (pg. 4).

Regarding claims 14 and 15, Cheng teaches the extraction of nickel and cobalt and a synergist that increases the pH gap for other elements such as manganese and calcium. These ions will not be extracted in the organic phase (p. 4, lines 23-32; pg. 9, lines 11-15).

Regarding claim 16, Cheng teaches preliminary iron precipitation that is conducted to precipitate out iron to leave an aqueous leach solution containing the target elements (pg. 11).

Regarding claims 22, 30, and 31 Cheng teaches the extraction of nickel and cobalt and a selective stripping stage. Cheng also teaches nickel, cobalt, copper, and zinc in a solve extraction and a stripping of the organic solution. Cheng teaches the use of organophosphinic acid (pg. 17, lines 21-37).

Regarding claims 23, 26, and 27, Cheng teaches the extraction and selective stripping of cobalt and nickel from the loaded organic solution. The cobalt can be extracted in the organic phase and then precipitated (pg. 9-11).

Regarding claim 36, Cheng teaches the same process of present claims 1 and 36, therefore the product recovered in the process will be the same.

Claim 11-13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Preston (GB 2,109,357) in view of Mihaylov (US 5,447,552) as in claims 1-4, 6-10, 18, 19, further in view of Davis (US 4,104,359). Davis teaches the separation and

Art Unit: 1793

nickel and cobalt in an acid leach where hydroxylamine sulfate (anti-oxidant) is added to the organic solution of an oxime, sulfonic acid and kerosene (Example). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the process of Preston and Mihaylov with the hydroxylamine of Davis because Davis teaches that the acidic components in the mixture can degrade the  $\alpha$ -hydroxyoximes but the hydroxylamine sulfate minimized the effects of degradation (Example 1; col. 1, lines 13-23; col. 2, lines 21-32).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng (WO 02/22896) in view of Mihaylov (US 5,447,552) as applied to claims 1, 2, 4-7, 14, 15, 16, 22, 23, 26, 27, 30 and 31 above. Further Cheng teaches the use of carboxylic acid in the extraction process where the carboxylic acid which contains any optionally substituted aliphatic or aromatic group, or combinations of these groups (pg. 5, lines 1-5). Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to use a 2-methyl, 2 ethyl heptanoic acid because Cheng teaches the application of a broad number of carboxylic acids to be used in a similar extraction process.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Preston (GB 2,109,357) in view of Mihaylov (US 5,447,552) as applied to claims 1-4; 6-10, 18, 19 above, and further it would have been obvious to one of ordinary skill in the art at the

time of the invention to maintain the pH as high as 5.5 or 6 as this pH is close to 5 and still acidic. Also, it is easier to neutralize a solution when the solution only has a pH of 6.

Claims 29, 32, 33, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng (WO 02/22896) in view of Mihaylov (US 5,447,552) as applied to claims 1, 2, 4-7, 14, 15, 16, 22, 23, 26, 27, 30 and 31 above, and further in view of Hummelstedt (US 4,120,817). Hummelstedt teaches the separation of nickel and cobalt with the use of an ion exchange reaction. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the ion exchange step of Hummelstedt with the copper separation of Cheng (pg. 18) because Hummelstedt uses the process to easily extract nickel with good pH control (col. 6, lines 47-68).

Regarding claim 32, Hummelstedt teaches nickel in an aqueous solution.

Regarding claim 33, Cheng teaches the recovery of cobalt in an aqueous leach solution from a selective stripping process where copper is removed (p. 15). Sulphuric acid may be used to strip the solution.

Regarding claim 34, Cheng teaches the use of organophosphinic acid and Hummelstedt teaches the recovery of nickel in an aqueous solution.

Regarding claim 35, Cheng teaches a scrubbing step. It would have been obvious to one of ordinary skill in the art to use the scrubbing step at each stage because scrubbing allows for selective stripping of ions (pg. 9).



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MELISSA STALDER whose telephone number is (571)270-5832. The examiner can normally be reached on Monday-Friday, 8:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MS

09-24-09

/Melvin Curtis Mayes/

Supervisory Patent Examiner, Art Unit 1793